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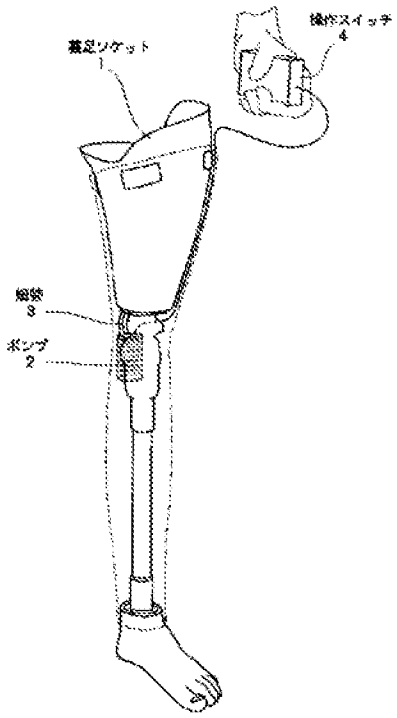
(71) Applicant 593219447
NARA GISHI KK
3-7-22 WEST 9 JO, NARA CITY, NARA PREFECTURE

(72) Inventor TAKITANI, NOBORU
402-7 WEST 9 JO, NARA CITY, NARA PREFECTURE

(74) Agent Patent attorney SUMIDA, YOSHIHIRO

(54) [TITLE OF THE INVENTION] MOUNTING STRUCTURE FOR PROSTHETIC LEG OR PROSTHETIC HAND

(57) [ABSTRACT]
[OBJECT] To provide a mounting structure for a prosthetic leg or prosthetic hand enabling a tight seal and secure attachment, through simple attachment, without requiring access operations when mounting.
[Structure] A prosthetic leg socket 1 and a suction/pressurizing pump 2 are connected by a short tube 3, and operated by an operating switch 4.



1: Prosthetic Leg Socket
3: Short Tube
2: Pump
4: Operating Switch

[SCOPE OF PATENT CLAIMS]
[CLAIM 1] A mounting structure for a prosthetic leg or prosthetic hand wherein a prosthetic leg socket or a prosthetic hand socket and a suction/pressure pump are connected.
[DETAILED EXPLANATION OF THE INVENTION]
[0001]
[FIELD OF USE IN INDUSTRY] The present invention relates to a mounting structure for a prosthetic leg or prosthetic hand.
[0002]
[PRIOR ART AND PROBLEM SOLVED BY THE PRESENT INVENTION] The following are known as conventional prosthetic leg or prosthetic hand mounting structures:
(1) As is illustrated in Fig. 2, there is a structure wherein the stump of a limb 12 is inserted into an insertion-type socket 11, and suspended from another portion by a suspension belt 13 (such as a waist belt or a hip band, or the like). (This shall be termed the "suspension type," below.)
(2) As is illustrated in Fig. 3, there is a structure wherein a vacuum pump 15 is provided in a socket 14, to provide an automatic suspending force. (This shall be termed the "suction type," below.)
However, while in the insertion type the mounting is easy, it requires a belt as an ancillary member, and the tightness of fit between the socket 11 and the limb stump 12 is not necessarily good, causing discomfort to the wearer.
[0003] In this regard, the vacuum type does not require an ancillary member such as a belt, and thus at present is the type that is used the most. Given this, the procedure for mounting the vacuum type will be described briefly below, as follows:
[0004] (1) A material with excellent lubricating properties, such as talc, is coated onto the inner peripheral surface of a socket 14 and onto the end portion of the limb stump, to promote slipperiness.
(2) Next, the end portion of the limb stump is covered with a cloth, such as a Japanese wrapping clock, and the limb stump is inserted into the socket 14 to cause a tight fit with the inner peripheral surface of the socket, and the cloth that is wrapped around the limb stump portion is pulled out from an opening at the position of attachment of a vacuum valve 15.
(3) The vacuum valve 15 is closed to create a somewhat negative pressure condition within the socket. That is, the vacuum valve 15 is provided with a one-way function that makes it possible for air to pass only from the inside of the socket 14 to the outside.
[0005] Fig. 4 (a) and (b) are figures illustrating schematically, in an extremely simple form, the physical principle of the vacuum type, likened to a piston cylinder mechanism. The piston 16 corresponds to the limb stump, and the cylinder 17 corresponds to the socket.
[0006] In this way, the vacuum type is a method that is mounted through a large number of stages, which is extremely time-consuming, and proper mounting requires some degree of skill. That is, there are the following shortcomings in the vacuum type:
(a) The time and effort required for coating with the lubricating agent; and
(b) The difficulty in removing the clock when the cloth that is wrapped around the end portion of the limb stump is pressed too far towards the bottom of the socket, while, on the other hand, if the cloth and the inner peripheral surface of the socket are in a loose state, the limb stump may fall out of the socket during walking.
(c) In some cases, such as when using a Japanese-style toilet, it is necessary to remove the vacuum socket due to the angle of the knee, and at that time, the complicated mounting operations set forth above must be performed. Furthermore, the suction socket tends to fall off when there is perspiration or when the individual sits on the floor.
[0007] In this way, in daily life there are many situations wherein the socket tends to fall off, and times wherein the socket must be removed. Given this, it necessary to have a method by which the socket can be remounted again easily; however the existing vacuum type cannot insert this need. Furthermore, because, to begin with, the vacuum type uses a method wherein it is suspended automatically using a vacuum valve that has a one-way function, during walking the tightness of seal between the limb stump and the inner peripheral surface of the socket gradually diminishes, and thus there is a shortcoming in that the limb stump falls out due to inadequate automatic suspension force.
[0008] The present invention is the result of contemplation on these types of problem areas in the prior technology, and the object thereof is to provide a mounting structure for a prosthetic leg or a prosthetic hand capable of a tight and secure fit, with simple mounting, not requiring excess work when mounting.
[0009]
[MEANS FOR SOLVING THE PROBLEM] The present invention for achieving the object set forth above can be summarized as a mounting structure for a prosthetic leg or prosthetic hand wherein there is a section/pressure pump connected to a prosthetic leg socket or a prosthetic hand socket.
[0010]
[ACTION] When the limb stump is inserted into the prosthetic leg socket or prosthetic hand socket, the pump switch is put to the vacuum side, evacuating the air within the socket, producing a negative pressure, causing a tight seal/secure fastening of the prosthetic limb with the inner peripheral surface of the socket.
[0011] Moreover, when the limb stump is removed from the socket, the pump switch is switched to the pressurizing side, reducing the tightness of fit between the inner peripheral surface of the socket and the limb stump through feeding air into the socket, so that the limb stump is removed from the socket.
[0012]
[EXAMPLE OF EMBODIMENT] An example of embodiment according to the present invention will be explained below based on Fig. 1. In Fig. 1, 1 is a prosthetic leg socket, and 2 is a suction/pressure pump, where this pump 2 and the prosthetic leg socket 1 are connected by a short tube 3. The short tube 3 is provided in the vicinity of the bottom portion of the socket 1, enabling uniform negative pressure to be produced within the socket 1 more quickly. 4 is an operating switch for the pump 2, where this operating switch 4 may be operated to not only turn the pump 2 ON and OFF, but also to adjust the vacuum pressure and pressurization pressure.
[0013] In this structure, if the pump 2 is turned ON and is put to the suction side, and the limb stump is inserted into

the socket 1 while the air within the socket 1 is exhausted to the outside, then there is no need for a cloth, or the like, which has been used conventionally, and no need for coating with an agent that promotes slipperiness, and the limb stump is sealed tightly and secured within the socket 1 smoothly. Furthermore, when it is necessary to remove the socket 1 when, for example, using the toilet, the pump 2 is switched to the pressure side to supply air into the socket 1, to enable the limb stump to be removed quickly, and when remounting, the limb stump can be fitted tightly and securely within the socket 1 using the extremely simple operation, as set forth above. When walking, while fundamentally the operating switch 4 need not be operated, if there is a reduction in the tightness of the seal between the socket 1 and the limb stump due to perspiration, or the like, the operating switch 4 may be operated to adjust the vacuum pressure of the pump 2 as appropriate, so that the socket 1 does not come off.

[0014] Additionally, while in the example of embodiment set forth above a case was explained wherein the socket 1 was applied to a prosthetic leg, it may, of course, also be applied to a prosthetic hand.

[0015]

[EFFECTS OF THE INVENTION] Because the mounting structure for a prosthetic leg or prosthetic hand as set forth in the present invention is structured as described above, it is possible to remove and attach the prosthetic leg or prosthetic hand with an extremely simple operation, regardless of the age or the gender of the wearer. Consequently, even when it is necessary to remove the prosthetic leg or prosthetic hand during daily activities, it is possible to do so without a feeling of frustration, making it possible to experience daily life with comfort.

[BRIEF DESCRIPTION OF THE DRAWINGS]

Fig. 1 is a front view of the mounting structure for a prosthetic leg as set forth in the present invention.

Fig. 2 is a front view [SIC -- "perspective view" ?] of a conventional mounting structure for a prosthetic leg.

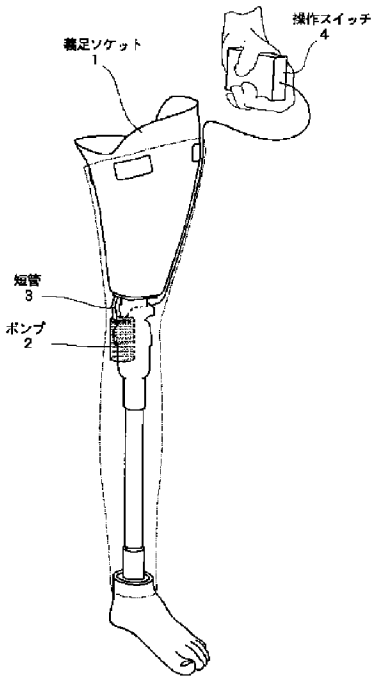
Fig. 3 is a front view of another conventional mounting structure for a prosthetic leg.

Fig. 4 (a) and (b) are schematic diagrams illustrating the principal in the vacuum type.

[EXPLANATION OF CODES]

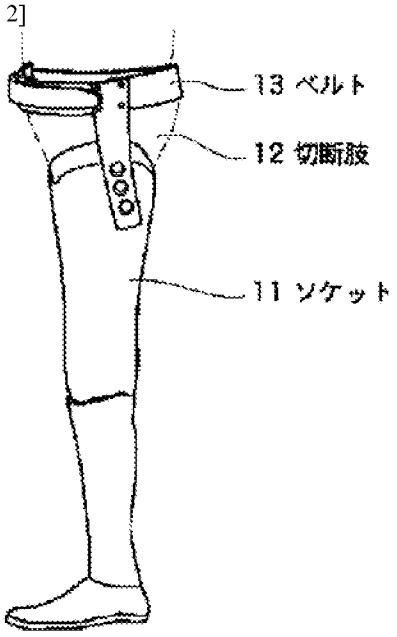
1. Prosthetic Leg Socket
2. Pump
3. Short Tube
4. Operating Switch
11. Socket
12. Limb Stump
13. Belt
14. Socket
15. Vacuum Valve
16. Piston
17. Cylinder

[FIG. 1]



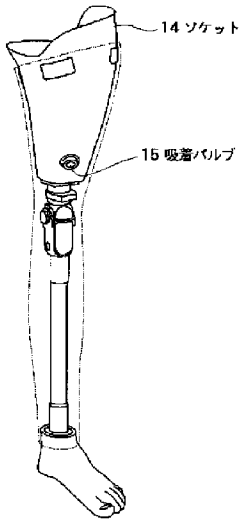
1. Prosthetic Leg Socket
4. Operating Switch
3. Short Tube
2. Pump

[FIG. 2]



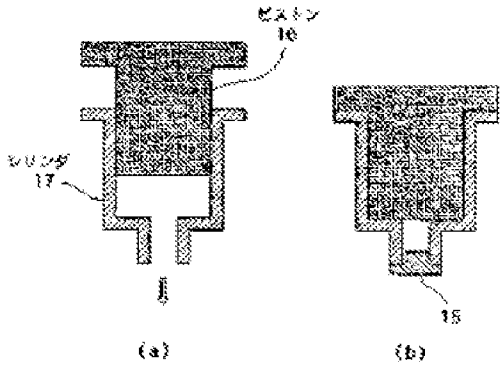
13. Belt
12. Limb Stump
11. Socket

[FIG. 3]



14. Socket
15. Vacuum Valve

[Fig. 4]



16: Piston
17: Cylinder